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**THESIS**

**BUSINESS PROCESS REENGINEERING WITH  
INFORMATION TECHNOLOGY AT THE MARINE CORPS  
BASIC SCHOOL**

by

Brian J. Brauer

September 2007

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**BUSINESS PROCESS REENGINEERING WITH INFORMATION TECHNOLOGY  
AT THE MARINE CORPS BASIC SCHOOL**

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## **ABSTRACT**

This thesis analyzed the principles and concepts of The Marine Corps Basic School (TBS) at the operational level and the current Information Management Systems used to track the progress of new officers. A web-enabled prototype for TBS was developed to enhance management and decision support for deliberate, time sensitive planning utilized to optimize student performance. The first iteration of the prototype was tested by the TBS Testing Officer. The results of this research revealed potential benefits for student leadership, academic, and tactical tracking. It also gave some insight to the benefits of a Marine Corps enterprise wide decision support system. This research will be used as a tool for requirements gathering as TBS assists in the development of the Marine Corps' Enterprise Training Information Management System.

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## **LIST OF SYMBOLS, ACRONYMS AND/OR ABBREVIATIONS**

ADMIN	Administration
AI	Assistant Instructor
CAC	Common Access Card
DSS	Decision Support System
DOD	Department of Defense
GCT	General Classification Test
JCIDS	Joint Capabilities Integration Development System
MCAIMS	Marine Corps Automated Instructional Management System
MCTIMS	Marine Corps Training Information Management System
MOS	Military Occupational Specialty
MOUT	Military Operations in Urban Terrain
NMCI	Navy Marine Corps Intranet
OCS	Officer Candidate School
OSO	Officer Selection Office
POI	Period of Instruction
RAD	Rapid Application Development
SPAWAR	Space and Naval Warfare Systems Command
SPC	Staff Platoon Commander
TBS	The Basic School
TMB	Technology Management Branch
USMC	United States Marine Corps

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## **I. INTRODUCTION**

### **A. BACKGROUND**

Currently the Marine Corps does not have a formal decision support system (DSS)[1]. A DSS could be utilized to enhance 4 components of the mission; tactical analysis, manpower distribution, acquisition procurement, and training. Application of a DSS for the Marine Corps is outlined for the first three components, and the focus of this thesis will be on the fourth component, training.

The Marine Corps has been approved the President of the United States to increase its end strength by 30,000 for a total of 205,000 on active duty [2]. One question at hand is where to insert these Marines into the current force structure. This type of mission critical decision can be enhanced with a DSS. Feeding the current threat assessment into a DSS along with the increased number of Marines could potentially depict an optimal location to integrate the added force structure to balance the threat. If the current world threat is Muslim extremists off of the Pacific Rim, a logical place to put the extra manpower would be Guam, given the fact that the Marine Corps is downsizing its footprint in Okinawa, Japan [3]. The Marine Corps currently relies on individual commanders to determine where force structure is inserted without the assistance of a formal decision support system.

The Marine Corps also does not have a DSS to determine which tactics should be used given a certain scenario. The utilization of a DSS could stream line the decision process

for combatant commanders in optimizing the use of force structure or at least provide an alternative to their current methodology. An example of this would be how to most effectively combat an insurgent force. Theoretically a commander could input the variables such as projected insurgent size, enemy capabilities, coalition size, coalition capabilities, and desired outcome to determine which course of action has the best chance of producing preferred results. This type of system could also benefit historical analysis detailing which tactics worked and which ones did not facilitating the learning curve for new commanders entering theater.

Acquisition procurement is the third problem set that this research could enhance. Acquisition procurement has variables such as cost, schedule, threat assessment, and risk that have to be taken into account before purchasing a system in the Department of Defense (DoD). Currently JCIDS is the system that the DoD utilizes to define acquisition requirements to ensure that the procurement of a system is beneficial to the organization [4]. This process could be streamlined and optimized through a decision support system. Similar to the previous two examples, the variables such as cost, schedule, and risk could be entered along with the desired end objective. The forecasted result would assist decision makers in determining if the acquisition benefits the organization. The rest of this thesis focuses on the fourth component of the mission, training.

The Marine Corps, like any large organization, is constrained by finances and personnel. With this in mind the Marine Corps and therefore The Basic School (TBS) need

to develop solutions within their constraints. The driving factor for this thesis is the reengineering of business processes utilizing the benefits of information technology to develop a DSS that will decrease cycle time and increase the efficiency of officer training.

## **B. MISSION**

TBS is the Marine Corps' three to six month Basic Officer Course that all commissioned officers and warrant officers go through before they are deployed to the Fleet Marine Force. The mission of the school is to train and educate newly commissioned or appointed officers in the high standards of professional knowledge, esprit-de-corps and leadership required to prepare them for duty as a company grade officers in the operating forces, with particular emphasis on duties, responsibilities, and warfighting skills required of a rifle platoon commander [5].

## **C. STATEMENT OF PROBLEM**

The challenge at TBS, and the focus of this research, is information management. The school is split up into eight different companies which are task organized by the S-3. Each company tracks their personnel information through an autonomous Microsoft Access Database and an Excel Worksheet titled the "Super Tracker". Each database is located on the school's server which is only accessible from a work station at Camp Barrett. Identical, but not synchronized data is stored in each location presenting a challenge for adding, deleting and updating data across all of the databases. Excessive amounts of time are being spent maintaining all of the databases resulting in inaccurate

data within and across each database. The databases and spreadsheets are used as tools to assist the Staff Platoon Commander (SPC) in writing the first and second command evaluation during the period of instruction. The SPC also relies on this database to accurately describe an officer's performance and abilities when determining which military occupational specialty to assign to the Marine or what course of action to recommend should an officer's performance be substandard.

The school also uses the Marine Corps Automated Instructional Management System (MCAIMS). MCAIMS is an enterprise system that the Marine Corps uses as the standard for instructional management. The system consists of four modules; system administration, curriculum management, evaluation management, and student management. The database assists the staff platoon commanders with storing test scores but it does not have the capacity to store subjective data such as peer evaluations, instructor evaluations, and staff platoon commander comments. MCAIMS also is accessible only by the Command Testing Officer. This system is being phased out and being replaced by the Marine Corps' Training and Education Command's Integrated Management System (MCTIMS), a web enabled Oracle database in fiscal year 2007 [6].

The Command uses a testing database that is accessible by the Command Testing Officer as well as each Company Testing Officer. This database is used to pull testing data from MCAIMS and store all objective test scores and then disseminate to each of the SPCs via the Company Testing Officers.

The Basic School (TBS) is capable of making their mission. The process being used is inefficient with SPCs spending fifteen minutes to two hours a day maintaining similar data in each of their perspective databases and worksheets. The command is very limited in their ability to conduct trend analysis with the current system. The command has no resident expert to call upon when problems with any of the databases or the excel spreadsheets occur. The SPCs collaborate with each other to rectify system problems which cause inherent inefficiency between the companies. Problem solutions are not always communicated to adjacent companies causing individual company staffs to come up with two different solutions to the same problem. The two Marine officers that developed the access databases and the excel spreadsheet used to track performance have executed permanent change of station orders leaving a void of resident expertise. Insufficient documentation was developed to allow for system updates by new users.

#### **D. ASSUMPTIONS**

The assumption in this thesis is that the Command's information management system would be greatly improved if all data was stored in one location allowing for all modifications, deletions, and required reports to be generated from one web enabled database. This thesis assumes that the Command's financial and personnel resources are limited so the development and maintenance cost will kept to a minimum to make mission capitalizing on the infrastructure already in place and streamlining the current business process.

## **E. METHODOLOGY**

This thesis will utilize a system methodology. A detailed analysis of TBS' decision information system has been conducted. A model driven analysis was utilized to identify the strengths and weaknesses of the TBS' decision support system in an effort to reengineer the business processes and develop a new system that will reduce the work load of the SPC as well as increase their efficiency.

## **F. SCOPE**

This thesis will focus on the benefits of process reengineering with information technology. A web enabled prototype database will be developed to store all relevant information on new officers going through TBS.

The scope of this thesis will include system analysis, system development, testing, and conducting a change plan. The first step was initiated by a top level inspection of the current system at TBS. Once all of the requirements were gathered a model-driven analysis was put together in an effort to identify the most optimal solution.

System development commenced immediately after the analysis was complete. This thesis focused on the development of this system around the user, specifically the company staff. In an effort to obtain as much feedback from the users, this thesis utilized rapid application development (RAD) to construct and test the new system [7].

This thesis understands that implementing a new system is challenging and the chances for success are increased by implementing a change plan in order to efficiently integrate it into TBS' work flow.

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## **II. SYSTEM ANALYSIS**

### **A. OVERVIEW**

The Basic School is the Marine Corps' institution used to teach tactics and leadership to all newly commissioned and warrant officers. The period of instruction (POI) lasts 6 months for all newly commissioned officers and 3 months for warrant officers. The officers are evaluated on leadership, patrolling, engineer capabilities, rifle range, weapons, martial arts, military operations in urban terrain (MOUT), convoys, offensive and defensive tactics, communications, artillery, and close air support, through in class tests, instructor and SPC feedback, field evolutions, and peer evaluations [8].

### **B. SITUATION**

The data is currently being captured through five different databases. Testing data is captured at the completion of each in class test utilizing scantrons which are collected read and transferred to a text file [9]. The text file is saved to a floppy disk which is uploaded to the Marine Corps Automated Instructional Management System (MCAIMS). MCAIMS is the Marine Corps' legacy standard instructional management system soon to be replaced by the Marine Corps Training Information Management System (MCTIMS) [10]. Once the scores are uploaded to the MCAIMS database, they are exported to a Microsoft Access Testing Database. The company testing officers will download the data to an excel spreadsheet and email it out to the SPCs [11]. The

SPCs receive the data on each of their respective Marines, copy the data from the testing officer's spreadsheet and paste it in their own Microsoft Access SPC Database and into an excel spreadsheet titled the Super Tracker.

Access control has been implemented into the MCAIMS database and the Testing Database. The TBS Testing Officer has access to MCAIMS and the testing database and provides the Company Testing Officers access to the Testing Database [12]. The databases that are currently being used at TBS reside locally on the school's shared server and are accessible only to users on Camp Barrett.

The challenges with the current system are three fold. Modifying, updating and deleting the current data are inefficient due to the fact that the same data is located in five different databases and changes on a regular basis. Like data being stored in multiple locations causes problems with data integrity and accountability. The staff is challenged to obtain a true picture of an officer's academic progress which is compounded if the officer changes companies during the period of instruction. Staff Officers are spending as much as 5 hours a day updating data and maintaining the multiple databases [13].

The next challenge is that the users only have access to the data if they are at their workstation on Camp Barrett. Currently the users do not have access to their data from remote locations. This causes obvious problems when a user wants to check on upcoming training events or performance measures during off hours. This also is one of the reasons why it is common for an SPC to spend 12-14 hour

days at work when a substantial amount of this work could be done at an offsite location providing flexibility in the work day.

Security is the final challenge with the current system. The school's data is unencrypted and stored in Microsoft Access Databases and Excel Spreadsheets [14]. This data includes social security numbers, phone numbers, addresses, and spousal information. The only databases that utilize access controls are MCAIMS and the Testing Database. The users do not claim to have data integrity problems but the vulnerability is constant with every user having access to every officer's data regardless if that Marine falls under that user's purview. This vulnerability opens up the system to malicious damage but also human error, both of which are often undetected.

### **C. STAKEHOLDERS**

There are three separate groups of stakeholders within the current system. The executive stakeholders fill the Commanding Officer, Executive Officer, and the Operations billets within TBS. The Commanding Officer's intent is for this thesis to build a tool that will reduce cycle time for the individual SPC [15]. The Executive Officer would like to see something like My MOS, a web enabled decision support tool currently utilized to assign Military Occupational Specialties to commissioned officers [16]. The Operations Officer would like to see something that will be able to pull data from the MCAIMS database in an effort to reduce cycle time and human error [17].

The SPCs are the end users. The data obtained by the end users was gathered by interviews from Marines that filled the billets of Command Testing Officer, Company Executive Officer, and SPC billets. The current processes show that multiple redundant steps are taking place to capture single pieces of data.

#### D. CHALLENGES

##### 1. Registration

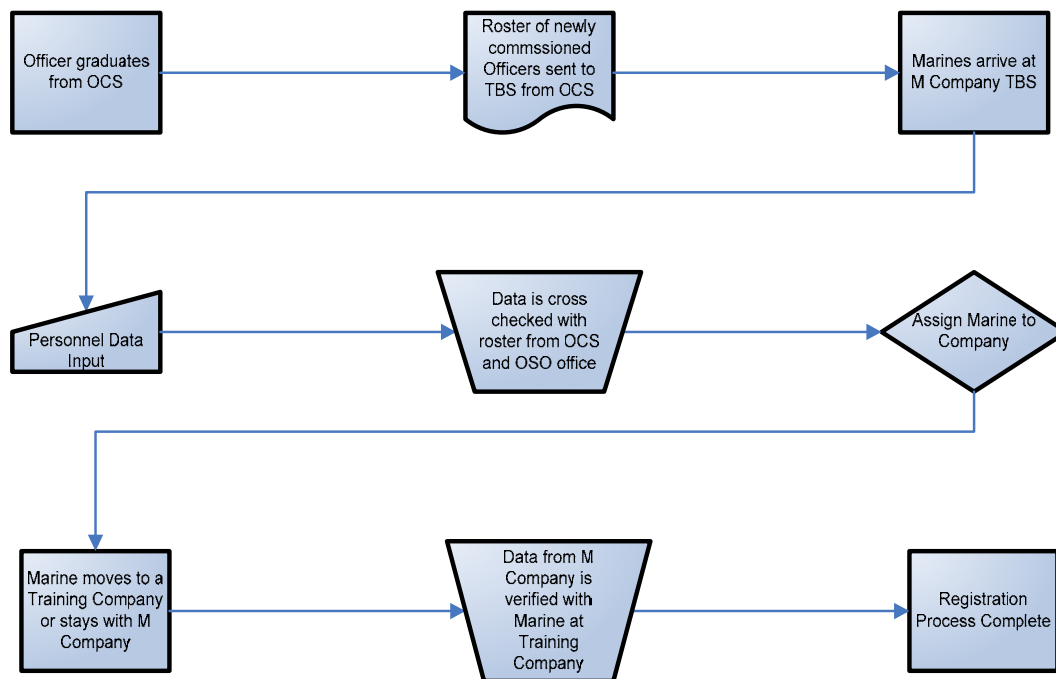


Figure 1. Registration Process [From: 14]

The first issue is the registration process. The Marines are commissioned at Officer Candidate School and then transferred to TBS for their follow on training. These Marines initially fall into M Company which is a temporary

holding unit. M Company receives a list of Marines from Officer Candidate School as well as the Officer Selection Offices (the OSO list is utilized if the officer does not go directly to TBS but works at the OSO office until a spot opens up at TBS) [18]. Once the new officers show up at TBS their information is manually input into the M Company database by the 3-4 junior officers comprising the M Company Staff. This causes immediate challenges with data integrity. The average company size at TBS is 250 Marines with 7 companies training per fiscal year. The required data of each new Marine is his or her full name, address, emergency contact numbers, room number, platoon and squad assignment, marriage status, height and weight status, ground or air contract, GCT score, vehicle information, education, previous training, and a picture. It takes the M Company Staff on average five 12-14 hour days to input all of the data for one company. The sheer repetition causes consistent human error. Once the officer's data is finalized with M Company the staff will create a roster and send it to the next training company [19].

The challenge with this process is accountability. This issue is prevalent prior to the Marine leaving Officer Candidate School (OCS). M Company receives a list from OCS but often times the list is inaccurate or even missing individual Marines. This inaccuracy is multiplied by the manual registration process at M Company resulting in a line by line scrubbing of the data once the Marine lands in his training company which occurs at zero week during the POI.

## 2. Assistant Instructors

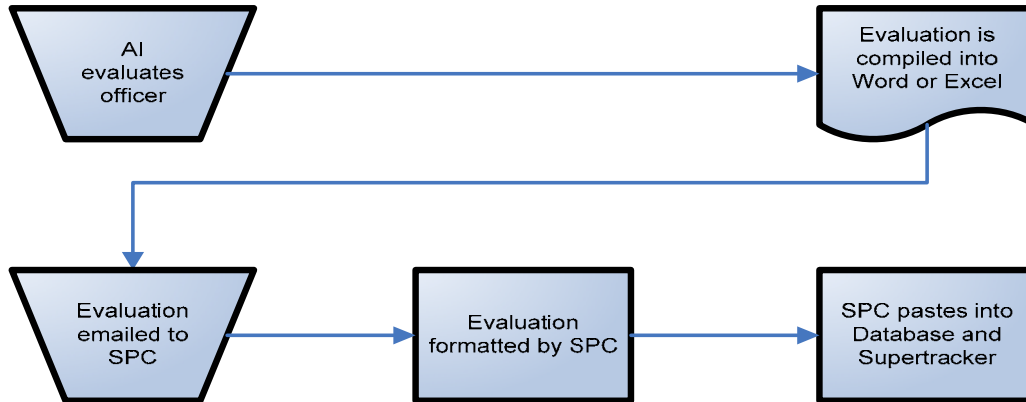


Figure 2. Assistant Instructor Process [From: 18]

Once the new officers start their training they are evaluated by the Assistant Instructors (AI) [20]. The AIs evaluate the performance of officers during the sand table exercises, classes, physical training events, and field exercises. The AIs will write up their evaluations in either a word or an excel document and email it to the SPC in charge of the junior officer. The junior officer will format it properly, copy and paste it into the SPC database.

The challenge with this process is that there is no standardization on how the AI creates the report. Once the SPC receives the report he needs to format it in a way that is usable with his database. This process takes more time and effort than is needed. Ideally the AI should have access to a central database with a standardized input form which can be viewed and analyzed by the SPC and the Company Staff.

### 3. Testing

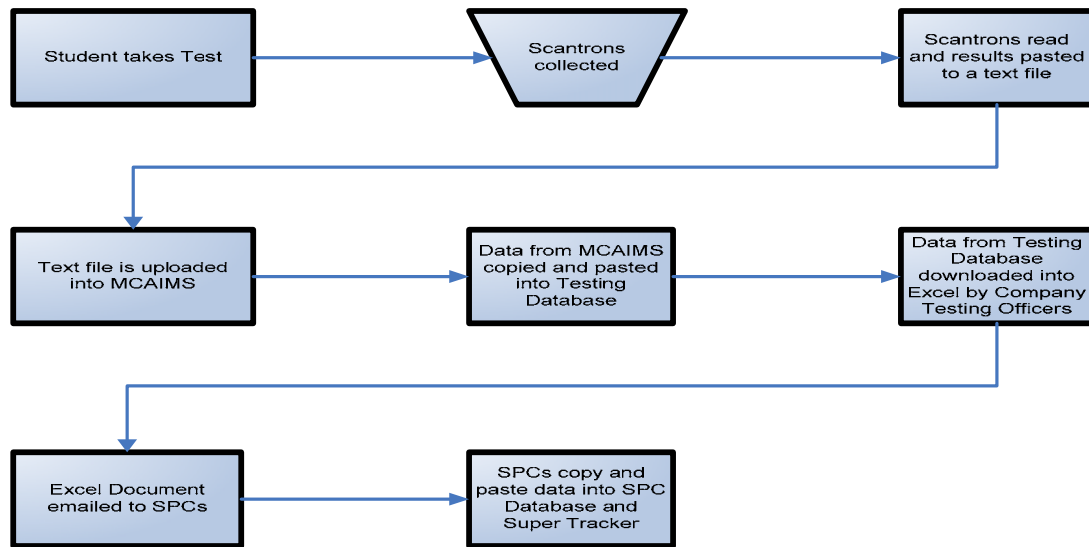


Figure 3. Testing Process [From: 9]

The testing process starts with the new officer entering the class room. He or she receives the test on a word document and a scantron to record the answers. Once the test is complete the scantrons are gathered, read and the scores are transferred to a text file. The text file is saved to a floppy disk and then uploaded into the MCAIMS database. Once the data is in the MCAIMS database the data is then copied and pasted into the Testing Database. Once the data hits the testing database the Company Testing Officers will then individually access the Testing Database, copy the information and paste it into an excel spreadsheet and email it out to the SPCs. The SPCs will then copy and paste the information from the spreadsheet to their SPC

database and their Excel Super Tracker. Based on experience it takes the Company Testing Officers approximately 20-90 minutes to perform this task.

The problem with this process is the redundant locations of the same data. The same data is stored in MCAIMS, Testing Database, SPC Database, Excel Super Tracker, and in the excel document emailed to each SPC. If officers miss an exam the information does not transfer to each database and spreadsheet properly. This causes integrity problems as well as extra steps that would not be required if the data was stored in one location with the stakeholders and end users having access to that data.

#### 4. Peer Evaluations

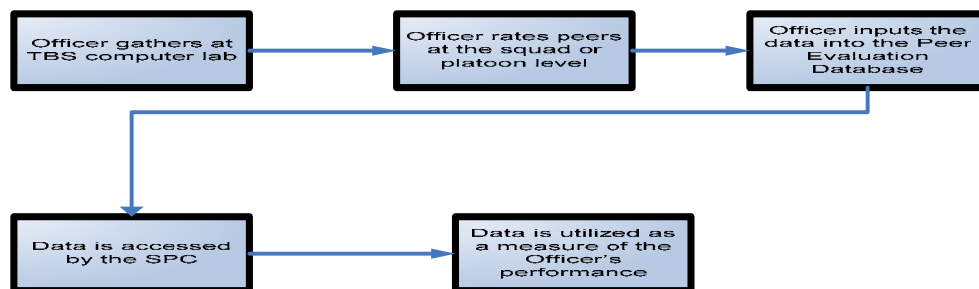


Figure 4. Peer Evaluations [From: 7]

Peer evaluations are conducted so the staff can get a feel for what the junior officer's assessment is on each of their fellow Marines. This provides insight to the staff on the junior officer's conduct when he is not being evaluated by the SPCs or AIs. The Peer Evaluations are conducted twice during the POI, once at the squad level and once again at the platoon level. The junior officers input their evaluations in a centralized computer room with 25



computers. Once this evolution kicks off it bogs down the network and all of the data goes into a separate database called the peer evaluation database. It takes 3-4 hours for the first evaluation and 5-6 hours for the second evaluation. The total cost for this evolution is approximately 2800 ((4X270) + (6X270) + (12X10)) man hours [21].

The final challenge illuminated by this analysis is the lack of resident expertise needed for system maintenance. SPCs know that they have data integrity issues with their databases but they are unwilling to make changes to the system for fear that they will make an error and not be able to remedy it [22].

#### **E. PLAN OF ACTION**

This analysis finds the current system at TBS would be more efficient if all data pertaining to officer performance was stored in one location with access from offsite locations as well as the work station at Camp Barrett. The data being stored is sensitive information and needs to be secured. This thesis recommends storing the central database behind the school's firewall with access controls for the staff, AIs and students with Common Access Card (CAC) access from off site locations.

The command needs to create a permanent position or out source a position that will maintain the centrally controlled web enabled system. This authority could insure that system security is maintained as well as provide user instruction on how to make modifications without harming the system.

The benefits from this approach over the current system are three fold. Storing all data in a central location provides time savings. The data could easily be stored, modified and retrieved from one database as opposed to performing these functions at multiple locations on the same data. Second, storing the data in one location improves data integrity and decreases the chance of corruption through multiple modifications to multiple databases. Accessibility would be enhanced through web access allowing data to be modified from the remote locations increasing the user's flexibility.

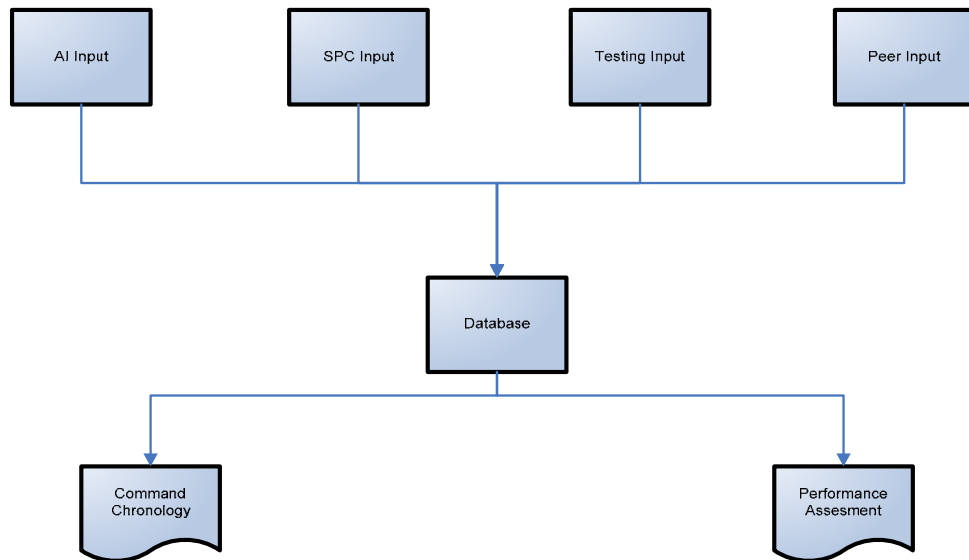


Figure 5. Data Flow Model

## **F. LOCATION**

The database and web interface could be stored at the Technology Management Branch (TMB) or the server located at Camp Barrett.

TMB is a secure facility that provides the storage for all major commands located on Marine Corps Base, Quantico VA [23]. This facility requires that all visitors sign in at the receptionist desk and wear a visitor badge while accompanied by a Marine at all times in the server area. The data stored on the servers in the TMB can only be accessed through positive identification through Public Key Infrastructure and the Common Access Card (CAC) card.

TBS is currently transferring their network over to the Navy Marine Corps Intranet. TBS uses a legacy server that stores all data on the officers going through the period of instruction, the Command's website and data on field exercises and company staff personnel information [24]. TBS backs up their information to tape every week as well as individual backups being conducted by the staff. Either location is adequate but since the support for the system will be at Camp Barrett, being collocated with the system provides benefits to the administrator.

The prototype will be developed utilizing Microsoft Access 2003 which will be structured through the modeling application, Microsoft Visio and the interface will be developed through Dreamweaver MX 2004. This prototype will be used to identify TBS requirements for MCTIMS [25].

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### **III. DATABASE CAPABILITIES**

#### **A. DATABASE SELECTION**

This thesis will utilize the capabilities of Microsoft's Access 2003 Database. Access is an application which is supported by the Navy Marine Corps Intranet (NMCI)[26]. This database is robust enough to fulfill TBS's information requirements and is currently what they use within each of their training companies. This thesis will fulfill its purpose as a proof of concept and be utilized during the requirements gathering process for Marine Corps' Training Information Management System (MCTIMS) design and development team [27].

This thesis utilized a preexisting database from TBS as a template [28]. Upon analysis of the preexisting database and the loose requirements set by TBS, the following entity relationship diagram was created.

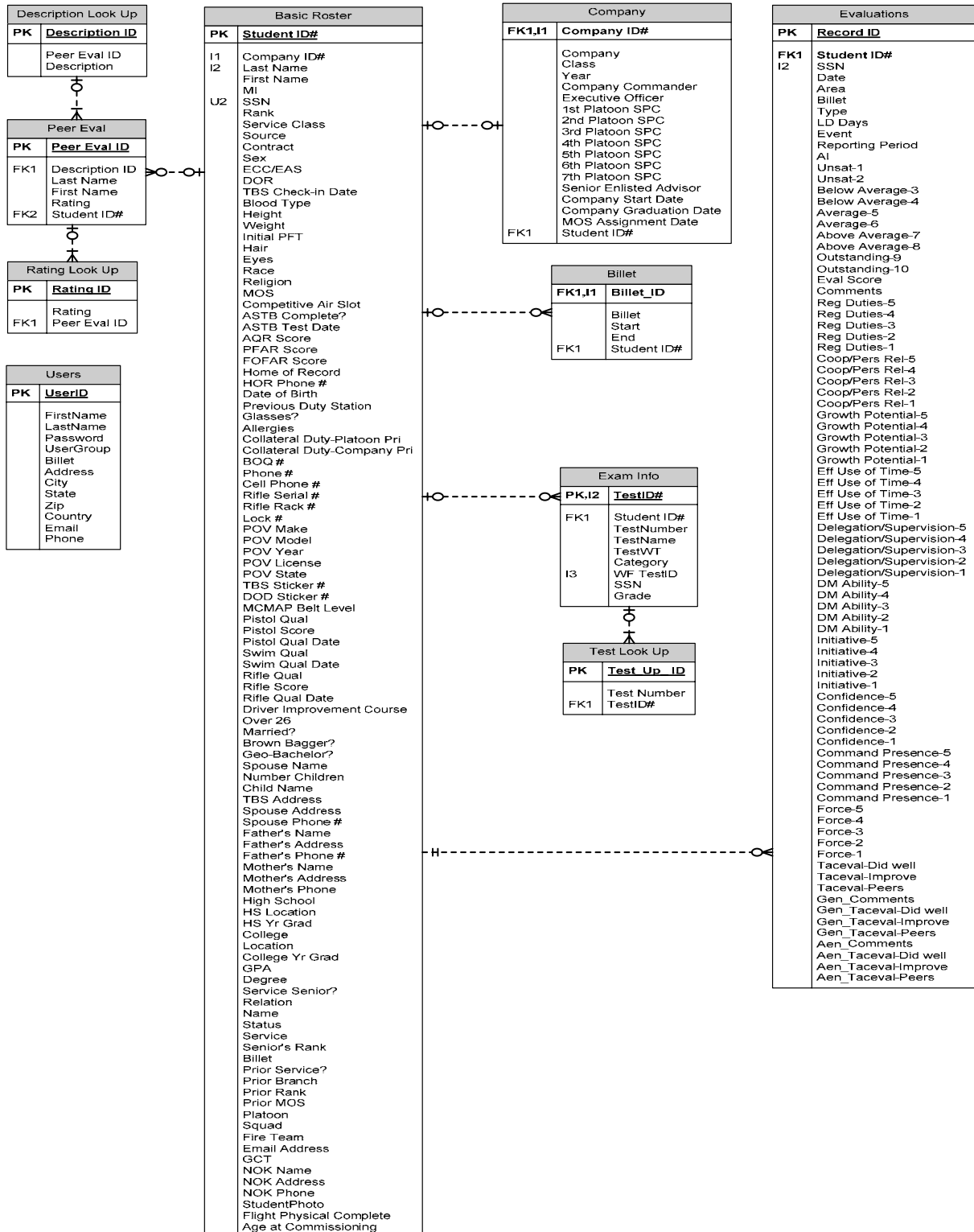


Figure 6. Relational Model

## **B. TABLES**

It is constructed of 10 tables linked with primary and foreign keys. The tables are as follows; Basic Roster, Billet, Company, Users, Evaluation, Peer Eval, Rating Look Up, Exam Info, and Test Look Up.

The Basic Roster is the central table that encompasses all of the attributes that describe the student entity. All one hundred-ten attributes are qualities that TBS see as vital in assessing student progress.

Billet contains the start and end date for each billet assigned to the students. This data is utilized in determining what jobs have been assigned to the students going through the period of instruction (POI).

Company is utilized to store the data attributes pertaining to all of the training units at TBS. Company level Commanding Officer, Executive officer, all Staff Platoon Commander's, Start Date, End Date, and Military Occupational Assignment Date are all stored in the Company table.

Users table stores all of the attributes describing the users of the system. This table will make it possible for the administrator of this system to track personnel using the system as well as manipulate passwords, and access based off of group privileges.

Evaluation table is utilized to store all data pertaining to a Marine's leadership progress during the period of instruction. This table provides a space for Instructors and Staff Platoon Commanders to individually evaluate a Marine and store it for future use. Evaluators

can input the date of the evaluation, text comments, score based off a 1-10 scale, type of evaluation, billet if applicable, and event.

Exam Info table is used to store all academic data. The table will have the Marines Student\_ID, Test Number, Test Name, Test Category, War Fighting Test ID, SSN and Grade. The TBS Staff use this data to determine a Marine's academic performance as well as any need for remediation.

Test Look Up table stores a list of academic tests that an evaluator will be able to use in a dynamic drop down menu.

Peer Eval table will store all data pertaining to individual ratings as well as single word descriptors that provide a picture of how a Marine's peers evaluate his or her performance.

Description look up and Rating look up tables are utilized to store the scale Marines are rated on as well as a list of positive and negative single word descriptors that will feed into dynamic drop down lists.

Student Collateral duties will house the data pertaining to secondary roles each student is assigned for each of the POIs. Examples of collateral duties are, ordinance officer, land navigation officer, uniform officer, along with several others that will be stored in this table.

### **C. SYSTEM DESCRIPTION**

Inputs will be conducted through a secure web interface. All data pertaining to registration, instructor evaluation, peer evaluations, company information, and users



with go through the web interface. Testing data will be dumped directly into the database by the testing officer.

This system will be able to conduct queries for recall information, student registration, evaluator comments, academics, and company information [29].

This Access database will be a stand alone system. There is no requirement for it to integrate with the legacy systems because TBS does not keep a digital copy of past students but maintains a hard copy archive of "green jackets" for each student that went through the POI. Should this system ever go live, TBS can utilize this database for the current year's POI and then it is recommended that the data be saved in an archive database to enhance expedient queries for current students. Should TBS need to pull data from past students, they can point the web interface to the archive file and perform their search.

Access will provide the capabilities required by the TBS staff to accurately and quickly assess the performance of new officers going through the POI. The Staff's familiarity with this application will aid in any future modifications and all future patches and maintenance will be sent out by Microsoft and facilitated by NMCI. The system could be migrated to a Microsoft SQL Server should the database size, performance or security issues arise.

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## **IV. WEB INTERFACE**

### **A. DEVELOPMENT**

The construction of the dynamic web interface was done with the development tool Macromedia's Dreamweaver MX 2004, [30] SQL code was used to construct the queries, [31] and the prototype resides on the Naval Post Graduate DONCIO server. Dreamweaver was utilized because of its ability to interface with Microsoft Access.

The interface design implemented navigation templates and a cascading style sheet in an effort to minimize maintenance time while maintaining uniformity.

Security has not been addressed in this thesis since TBS is going to use this prototype as a functional picture board for the MCTIMS development team. The focus of this design was to keep the interface user friendly in an effort to minimize required training.

### **B. MODULES**

#### **1. Registration Module**

The first module constructed was registration page.

Rank	WO	EAS	1 Jan
SSN		Email	
Foreign Officer	No	TBS Address	
First Name		TBS City	
Last Name		TBS State	
Middle Initial		TBS Zip	
Gender	Male	TBS Phone	
Date Of Birth	1 Jan	Married	Yes
Height	50	Spouse Address	
Weight	120	Spouse City	
Company	Alpha 2007	Spouse State	
Platoon	1st Platoon	Spouse Zip	
Squad	1st Squad	College	
Fire Team	1st Fire Team	Degree	
Eye Color	Brown	Date of Graduation	1 Jan
Hair Color	Brown	GPA	
Race	Caucasian	Prior Service	No
Religion		Service	N/A
Initial PFT		Prior Rank	N/A
Contract	Ground	Prior MOS	

Figure 7. Registration Module

This page was designed using an input form with an embedded table. Each of the fields holds data that the SPC's track during the POI. Validation tools were used to ensure that each of the required fields was filled prior to submission. Character constraints were used to help deter any type of buffer over flow attack as well as guide proper data input. The social security number is key data that is used to conduct searches. Validations were enabled to ensure that the social security number being entered is unique in the system. If the social being entered matches a social in the system the following error message will pop up upon clicking submit.

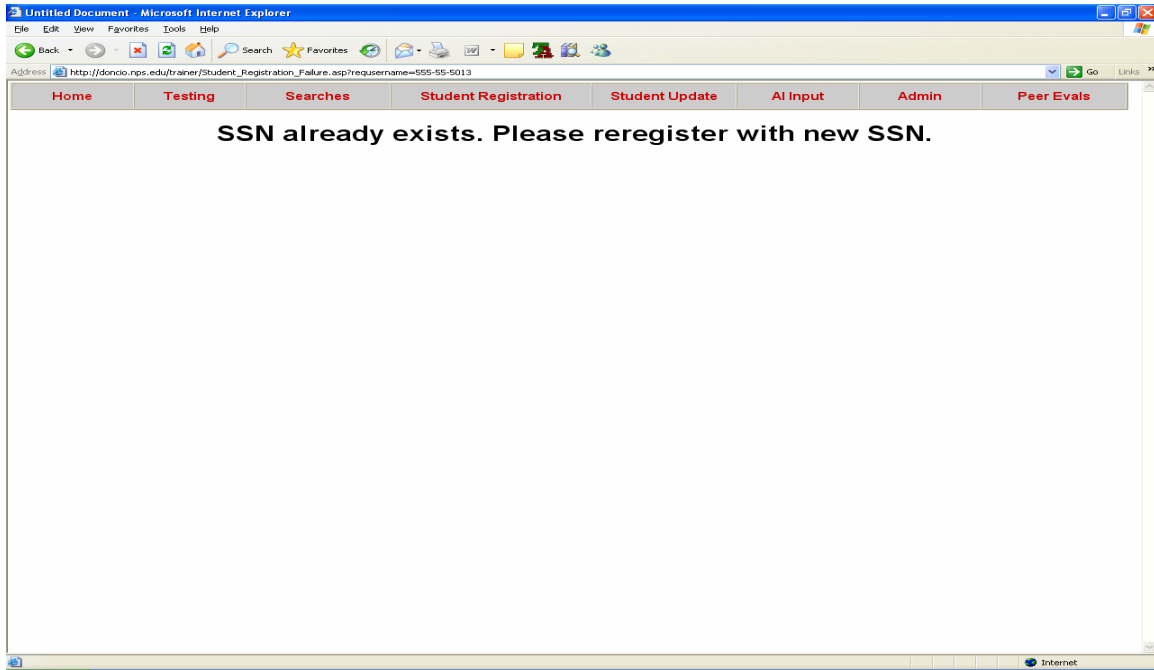


Figure 8. Social Security Failure Message

If the register fails to enter data in the required fields any or all of the following messages will pop up directing him to enter this data. The user will need to click "OK" on the message prompt acknowledging the error and then add the data. The below message denotes the error message.



Figure 9. Input Error Message

## 2. Student Update Module

The student update function was designed to enable the student and or the staff to update a student's information. This thesis constructed this functionality with the Master

Details page denoting the social security number as the link between the alphabetic list to the details page. This page lists 10 names at a time and has a scroll feature at the bottom that will send the user to next page, previous page, first page, or last page.

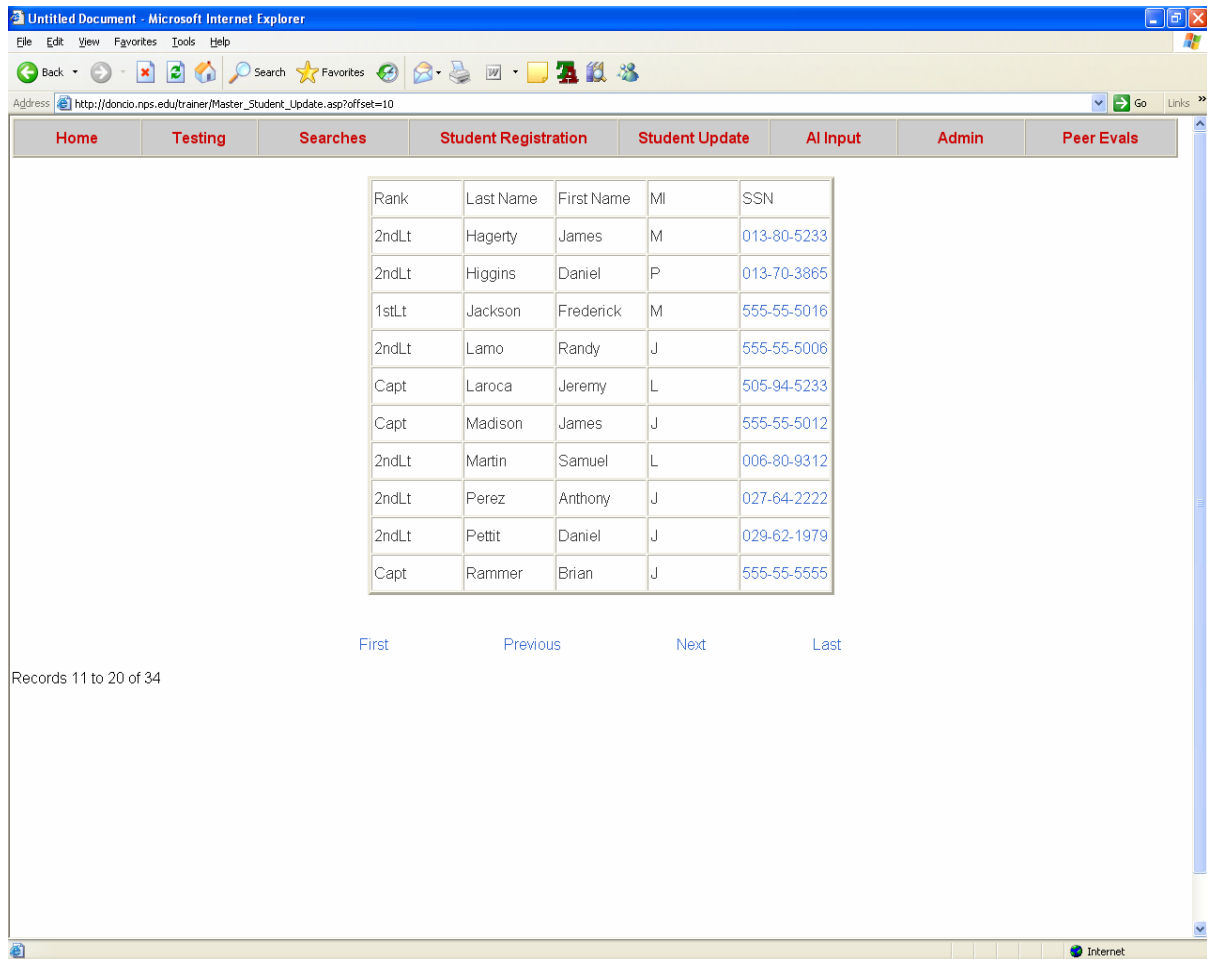


Figure 10. Student Update Master

Once the user clicks on one of the social security numbers he will be sent to the details page where he can make any changes and click submit to update. This prototype utilized product reuse so this page has the same field constraints and requirements as the student registration

page. This reuse provides a familiarity to the user while ensuring parameters are in place for data quality.

The screenshot shows a web browser window with the address bar displaying a URL. The browser has a menu bar (File, Edit, View, Favorites, Tools, Help) and a toolbar with navigation buttons. The page has a navigation bar with links: Home, Testing, Searches, Student Registration, Student Update, AI Input, Admin, and Peer Evals. The main content area displays a form titled 'Student Update' with the following fields:

Company	Alpha 2007	MOS	9910
Last Name	Hagerly	EAS	1 Jan 2011
First Name	James	TBS Address	848 Cannon Rd
MI	M	TBS City	Quantico
SSN	013-80-5233	TBS State	VA
Rank	2nd Lt	TBS Zip	68742
Foreign Officer	No	TBS Phone	893-889-4323
Gender	Male	Married	No
Date of Birth	8 Aug 1982	Spouse Address	
Height	69	Spouse City	
Weight	171	Spouse State	
Platoon	1st Platoon	Spouse Zip	
Squad	1st Squad	College	University of Colorado
Fire Team	1st Fire Team	Degree	Business Administration
Eyes	Brown	College Graduation Date	1 Jan 2002
Hair	Brown	GPA	3.99

Figure 11. Student Update Details

Once the user makes his changes, fills all of the required fields, and clicks submit he will be sent to the following page.

The screenshot shows the same web browser window as Figure 11, but the page content has changed. The navigation bar remains the same. The main content area now displays a confirmation message: "Student Info Updated".

Figure 12. Student Update Confirmation

This affirmation page communicates to the user that the data update is complete.

### 3. Assistant Instructor Module

The AI Input page was developed so that AI's could input their data from any location with connectivity and the responsible SPC could see it instantly. The design for this page also utilized product reuse that looks very similar to the Student Update page. All of the officers are listed alphabetically with the social security number being the hyper link between the master and the detail page.

Rank	Last Name	First Name	MI	SSN
2ndLt	Attric	Jerry	K	<a href="#">555-55-5013</a>
2ndLt	Brainer	George	M	<a href="#">555-55-5010</a>
Capt	Brauer	Brian	M	<a href="#">555-55-5011</a>
2ndLt	Darringer	Tim	L	<a href="#">232-23-2323</a>
WO	Dennis	James	J	<a href="#">555-55-5021</a>
2ndLt	Digger	Richard	R	<a href="#">666-89-7989</a>
WO	Franks	Tommy	L	<a href="#">666-48-4343</a>
2ndLt	Fruitter	Frank	M	<a href="#">555-55-5008</a>
2ndLt	Galaway	Brendan	L	<a href="#">002-66-6031</a>
Capt	Gander	Gerald	F	<a href="#">555-55-5004</a>

Records 1 to 10 of 34

[Next](#) [Last](#)

Figure 13. AI Input Master



Once the officer is selected the user will click on the social security number and see the AI Input form.

Unsatisfactory Below Average Average Above Average Excellent

○ 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ 7 ○ 8 ○ 9 ○ 10

June 2007

Su Mo Tu We Th Fr Sa

27 28 29 30 31 1 2

3 4 5 6 7 8 9

10 11 12 13 14 15 16

17 18 19 20 21 22 23

24 25 26 27 28 29 30

1 2 3 4 5 6 7

SNO positive performance.

Suggested Improvement.

Peer comparison in current POI.

Reset Submit

\* denotes required field.

Figure 14. AI Input Details

The AI Input page pulls the officers first name, last name, middle initial, physical fitness score, company, platoon, squad, and fire team information. This information helps identify the officer to the user. The AI Input page was designed to ensure that the appropriate data was entered to provide a solid performance evaluation. This page utilized drop down menus providing uniform data entry with greater search ability. The calendar was inserted to ensure uniform date entry. The calendar was a piece of mobile code

purchased through Macromedia. The calendar automatically picks the current day with the option for the user to select a different date.

The event field is utilized to describe the occasion the Marine is being evaluated on and is required for the data to be entered in the database.

Radio buttons are used to rate the officer on a scale from 1-10 with 1 being the lowest and 10 being the highest.

There are three text boxes that are utilized. The first text box allows the evaluator to describe the positive features of the officer's performance. The second one is used to describe what the officer needs to work on and the third lets the evaluator rate the officer out of a predetermined number of officers. Each of these text boxes is initially populated with instructions for ease of use.

Should the evaluator feel that he wants to start over he can click on the reset button and erase all data being entered.

This page is restricted to SPC, AI, and Administrator use only. This restriction helps ensure that the integrity is not compromised by someone other than an evaluator. If a student tries to access the AI Input page he will receive the following error.

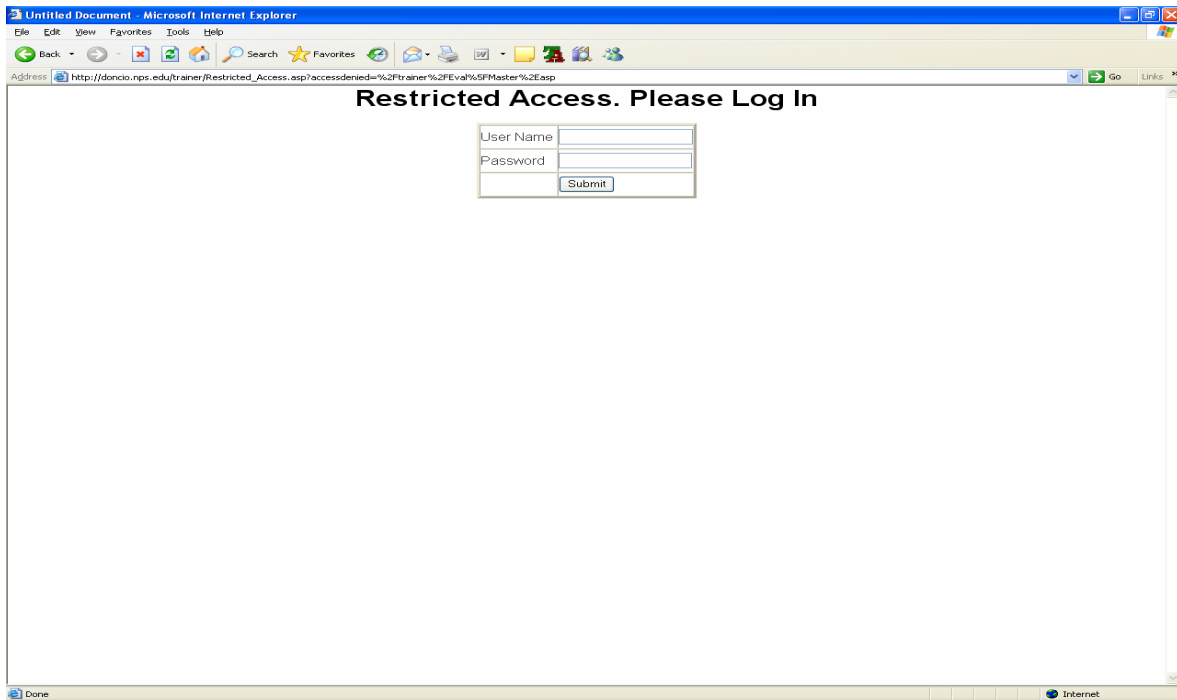


Figure 15. Restricted Access Message

Upon successful completion the following message will signify that the information has been submitted.

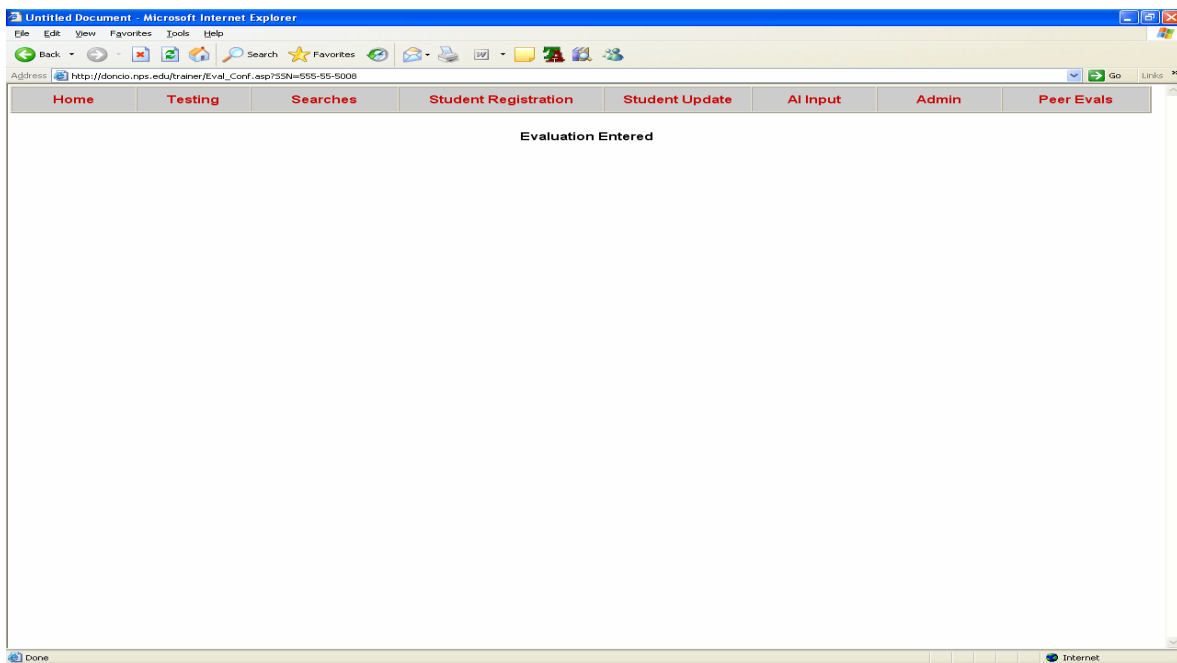
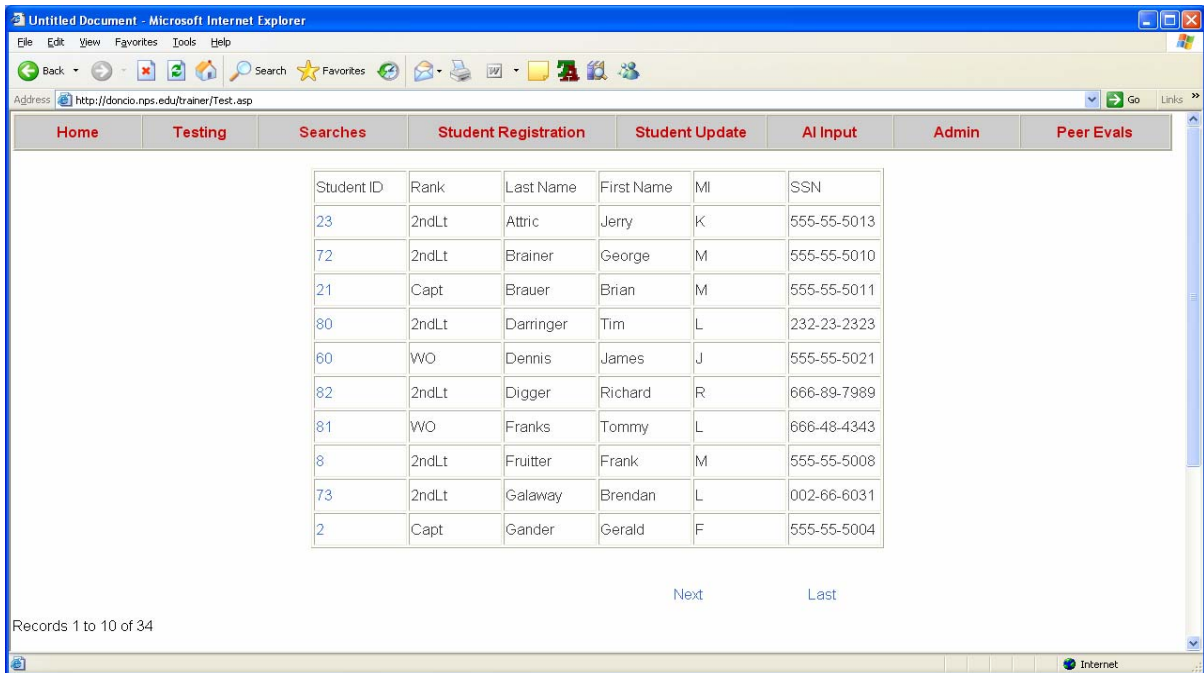


Figure 16. Evaluation Input Confirmation

#### 4. Search Module

If the user wants to see how an officer is progressing through the POI, he can click on the searches link. The searches page was developed with a master detail design where the user can scroll through the list of officers and click on the Student ID hyper link to go to the details page.



Student ID	Rank	Last Name	First Name	MI	SSN
<a href="#">23</a>	2ndLt	Attric	Jerry	K	555-55-5013
<a href="#">72</a>	2ndLt	Brainer	George	M	555-55-5010
<a href="#">21</a>	Capt	Brauer	Brian	M	555-55-5011
<a href="#">80</a>	2ndLt	Darringer	Tim	L	232-23-2323
<a href="#">60</a>	WO	Dennis	James	J	555-55-5021
<a href="#">82</a>	2ndLt	Digger	Richard	R	666-89-7989
<a href="#">81</a>	WO	Franks	Tommy	L	666-48-4343
<a href="#">8</a>	2ndLt	Fruitter	Frank	M	555-55-5008
<a href="#">73</a>	2ndLt	Galaway	Brendan	L	002-66-6031
<a href="#">2</a>	Capt	Gander	Gerald	F	555-55-5004

Next Last

Records 1 to 10 of 34

Figure 17. Searches Master Module

#### 5. Search Details Module

The details output page lets the user see every evaluation that has been conducted on that officer to include his entire academic performance as well as how his peers have evaluated him. This page is a one stop shop for the SPC when his is conducting his first and second command evaluation. This is also a good place for a staff platoon commander to go in the event that the new officer is not

capable of leading Marines and needs to be remediated or sent to another training company to restart the POI. This page will quickly provide the information needed for decision makers to realize if an officer's performance meets the requirements of the Fleet Marine Force.

Untitled Document - Microsoft Internet Explorer

Address [http://doncio.nps.edu/trainer/Test\\_Output.asp?Student\\_ID=72](http://doncio.nps.edu/trainer/Test_Output.asp?Student_ID=72)

Home Testing Searches Student Registration Student Update AI Input Admin Peer Evals

2ndLt Brainer George M Student ID 72

PFT 285 Alpha 2007 1st Platoon 1st Squad 1st Fire Team

Type Formal Interview Area - Billet N/A Event 1st Command Eval Days (Lt Duty) 0

Date 5 15 2007 SNO is organized, focused and full of ambition. He is a perfectionist and seeks success in everything he does. SNO needs to foster his ambition in his subordinates. Rank 15 of 40. Evaluator rruger@usmc.mil

Record 79

Score 8

Academics

ID	Rank	Last Name	First Name	Test Name	Grade
72	2ndLt	Brainer	George	Patrolling Exam	98
72	2ndLt	Brainer	George	Defense Exam	86
72	2ndLt	Brainer	George	Engineer / Aviation / NBC Exam	100

Peer Evaluations

Evaluation	Rating	Positive	Negative	Evaluator
Platoon	2	Trustworthy	-	jameson@usmc.mil
Squad	2	Trustworthy	-	bjbrauer@nps.edu

Figure 18. Searches Details Module

## 6. Peer Evaluation Module














Peer evaluations are conducted twice during the POI for squads and then for platoons. A company of 270 students conduct evals which takes 3-4 hours for the squad evaluation and 5-6 hours for the platoon evaluation. It takes approximately 12 Marines to support this evolution to answer




student questions. Approximate cost is 2800 ((4X270) + (6X270) + (12X10)) man hours. The peer evaluation module was created to enhance scheduling flexibility with the training staff.

Access to the peer evaluations form is restricted to student use only and can be opened and closed by an administrator. Potentially the module could be opened up to students for a one week time period where they could log on to the system where ever there was internet connectivity and do peer evaluations with out interrupting training. The module is designed with a master page consisting of a table listing all companies, platoons, and squads.

Untitled Document - Microsoft Internet Explorer

File Edit View Favorites Tools Help

 Back     Search  Favorites       

Address  http://doncio.nps.edu/trainer/Peer\_Eval\_Master.asp  Go  Links

Home

Testing

Searches

Student Registration

Student Update

AI Input

Admin

Peer Evals

Company	Alpha 2007				Company	Bravo 2007			
Platoon	1st Platoon	2nd Platoon	3rd Platoon	4th Platoon	Platoon	1st Platoon	2nd Platoon	3rd Platoon	4th Platoon
Squad	1st Squad	1st Squad	1st Squad	1st Squad	Squad	1st Squad	1st Squad	1st Squad	1st Squad
	2nd Squad	2nd Squad	2nd Squad	2nd Squad		2nd Squad	2nd Squad	2nd Squad	2nd Squad
	3rd Squad	3rd Squad	3rd Squad	3rd Squad		3rd Squad	3rd Squad	3rd Squad	3rd Squad

Company	Charlie 2007				Company	Delta 2007			
Platoon	1st Platoon	2nd Platoon	3rd Platoon	4th Platoon	Platoon	1st Platoon	2nd Platoon	3rd Platoon	4th Platoon
Squad	1st Squad	1st Squad	1st Squad	1st Squad	Squad	1st Squad	1st Squad	1st Squad	1st Squad
	2nd Squad	2nd Squad	2nd Squad	2nd Squad		2nd Squad	2nd Squad	2nd Squad	2nd Squad
	3rd Squad	3rd Squad	3rd Squad	3rd Squad		3rd Squad	3rd Squad	3rd Squad	3rd Squad

Internet

Figure 19. Peer Evaluation Master

Once the user clicks on the platoon or squad he will be presented with an input form with drop down menus in which he can rate the officer and then add a positive or negative descriptor to the evaluation.

Rank	First Name	Last Name	Company	Platoon	Squad	Rating	Positive	Negative	Student ID	Submit
2ndLt	Tim	Darringer	Alpha 2007	4th Platoon	1st Squad	<input type="text"/>	<input type="text"/>	<input type="text"/>	80	
WO	James	Dennis	Alpha 2007	4th Platoon	2nd Squad	<input type="text"/>	<input type="text"/>	<input type="text"/>	60	
WO	Tommy	Franks	Alpha 2007	4th Platoon	1st Squad	<input type="text"/>	<input type="text"/>	<input type="text"/>	81	
Capt	Gerald	Gander	Alpha 2007	4th Platoon	3rd Squad	<input type="text"/>	<input type="text"/>	<input type="text"/>	2	
1stLt	Frederick	Jackson	Alpha 2007	4th Platoon	1st Squad	<input type="text"/>	<input type="text"/>	<input type="text"/>	26	
Capt	James	Madison	Alpha 2007	4th Platoon	3rd Squad	<input type="text"/>	<input type="text"/>	<input type="text"/>	22	
2ndLt	Richard	Rank	Alpha 2007	4th Platoon	2nd Squad	<input type="text"/>	<input type="text"/>	<input type="text"/>	69	

Figure 20. Peer Evaluation Details

When the evaluation is complete he will click on the submit button and receive the following message.

Evaluation Entered

Figure 21. Peer Evaluation Confirmation

Once the evaluations are entered they will dynamically appear in the details output page.

## 7. Testing Module

Testing data is captured in the testing module. The data is currently being captured in a Microsoft Office testing database and then disseminated by each of the Company Testing Officers to the SPCs. This prototype's testing module could effectively do away with the testing officer's position freeing up that officer to conduct value added tasks. Now the TBS Testing officer can download his data into this database providing all testing data immediately to all SPCs and students at one time. Users can click on the testing link and be sent to the below page where they can pick which test to view.

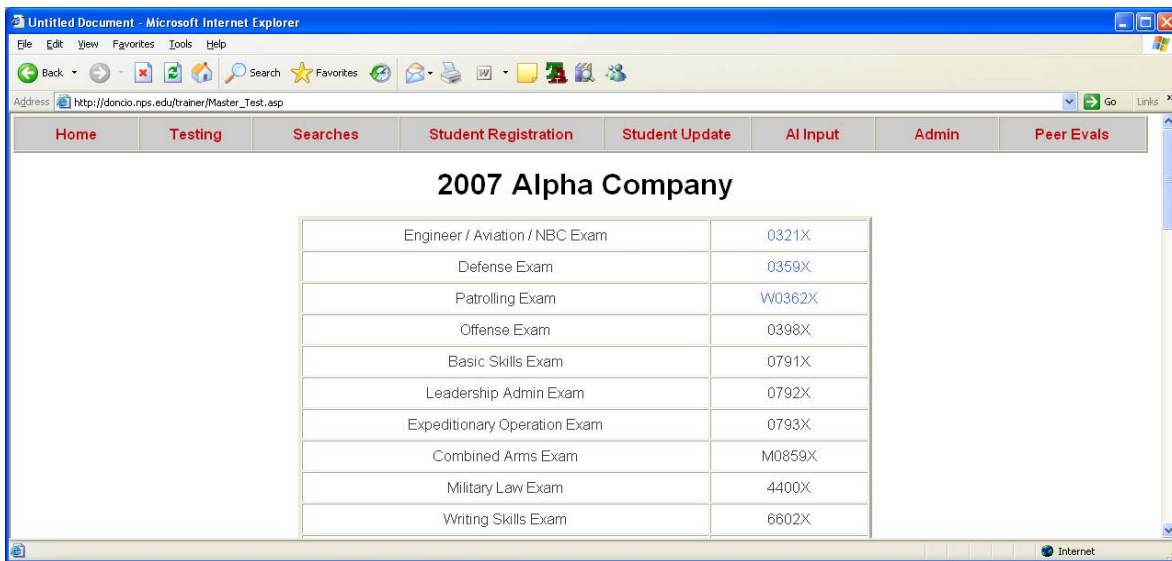


Figure 22. Testing Master

Once the user selects the test results he is interested in he will see all of the students that have taken the test as well as the score they each received.



ID	Rank	Last Name	First Name	Test Name	Grade
23	2ndLt	Attric	Jerry	Patrolling Exam	100
72	2ndLt	Brainer	George	Patrolling Exam	98
21	Capt	Brauer	Brian	Patrolling Exam	89
80	2ndLt	Darringer	Tim	Patrolling Exam	92
60	WO	Dennis	James	Patrolling Exam	95
8	2ndLt	Fruitter	Frank	Patrolling Exam	96
73	2ndLt	Galaway	Brendan	Patrolling Exam	86
2	Capt	Gander	Gerald	Patrolling Exam	94
76	2ndLt	Hagerty	James	Patrolling Exam	96
1	Capt	Rammer	Brian	Patrolling Exam	90

Figure 23. Testing Details

This type of functionality will save an estimated 2 hours of work time per company testing officer and 20 minutes of cut and paste work for the SPCs. This will yield an estimated  $(2 + (6 \times .33)) = 4$  man hours saved for the staff per test or 320 man hours per POI, and provide increased academic visibility to the students.

## 8. Admin Module

The "Admin" link was designed to allow administrators to change group privileges and passwords to users as well as create training companies in the system and designate and modify the primary staff. Students and Staff can utilize this page to see recall rosters.

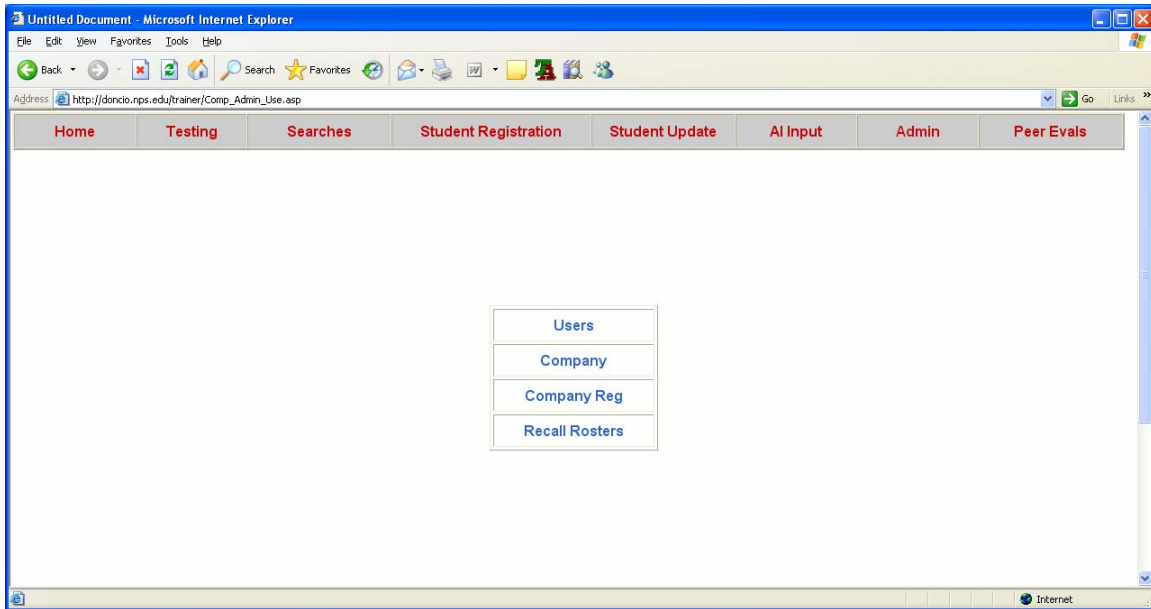


Figure 24. Admin Module

Access Restriction has been implemented so that only administrators can view user information, add companies and designate/modify company staff. The layout maintains the standard master detail page design.

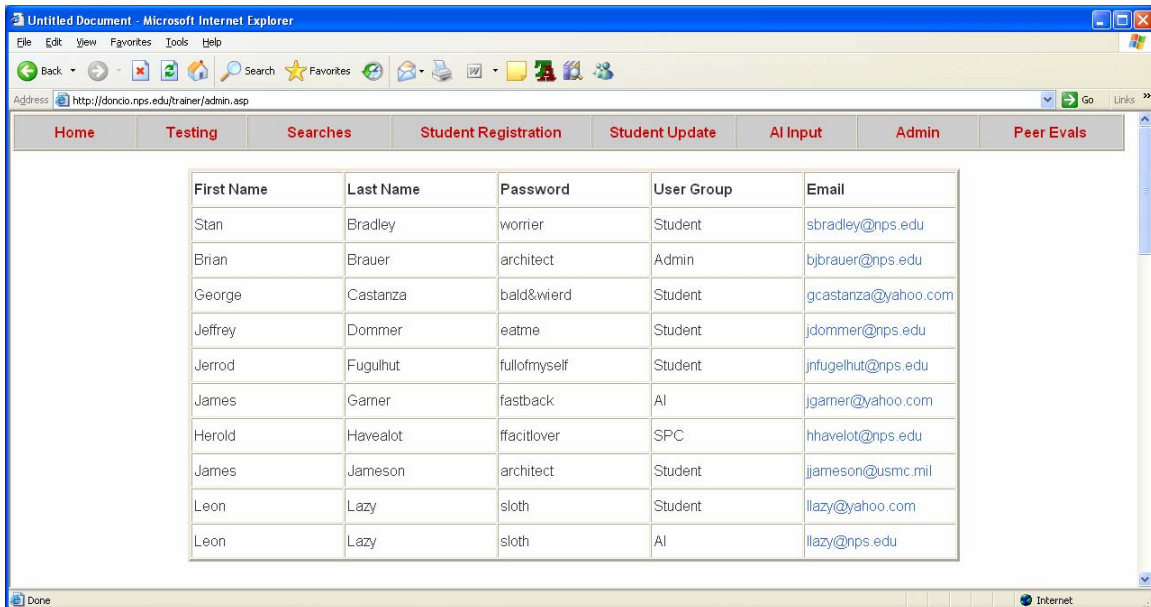


Figure 25. User Master

Once the administrator finds the user he wants to view he can click on the email hyperlink and view/modify the user's information.

Untitled Document - Microsoft Internet Explorer

Address: http://doncio.nps.edu/trainer/admin\_index.asp?UserID=12

Home Testing Searches Student Registration Student Update AI Input Admin Peer Evals

Use the drop-down to change permission group and click submit to effect change.

First Name	Stan
Last Name	Bradley
Password	worrier
User Group	Student
Email	sbradley@nps.edu
New User Group	SPC
New Password	worrier
<input type="button" value="Submit"/>	

Figure 26. User Details

Untitled Document - Microsoft Internet Explorer

Address: http://doncio.nps.edu/trainer/admin\_update\_conf.asp?UserID=12

Home Testing Searches Student Registration Student Update AI Input Admin Peer Evals

**Congratulations. Your update has been made.**

Figure 27. User Update Confirmation

## 9. Company Input Module

The "Company" link allows an administrator to enter the primary staff of upcoming training companies. Drop downs are utilized to keep the inputs consistent for the company, rank and dates.

Company	Alpha
Company CO	Capt
Company XO	1stLt
1st Plt SPC	1stLt
2nd Plt SPC	1stLt
3rd Plt SPC	1stLt
4th Plt SPC	1stLt
Senior Enlisted	SSgt
Advisor	
Company Start Date	1 Jan
Company Graduation Date	1 Jan
MOS Assignment	1 Jan
<input type="button" value="Submit"/>	

Figure 28. Company Input Module

If the administrator wants to modify the information input he can click on Company and select from a list of companies that he can change.

Company ID	Company	Year
1	Alpha	2007
2	Bravo	2007
3	Charlie	2007
4	Delta	2007
5	Echo	2007

Figure 29. Company Update Master

Once the user selects the company that he wants to modify, he can click on the "Company ID" and be sent to the update page.

Company	Alpha
Company CO	Maj Husker
Company XO	Capt Sooner
1st Plt SPC	Capt Aggie
2nd Plt SPC	Capt Tiger
3rd Plt SPC	Capt Longhorn
4th Plt SPC	Capt Jayhawk
Senior Enlisted Advisor	GySgt Cyclone
Company Start Date	1 Mar 2007
Company Graduation Date	1 Sep 2007
MOS Assignment Date	1 Jul 2007
Submit	

Figure 30. Company Update Details

The administrator can modify the significant dates and staff names from this page. Once he is done he will click on submit which will provide him with the following confirmation.

Company info updated.

Figure 31. Company Update Confirmation

## 10. Recall Roster Module

The recall rosters are open to student or staff. If the user needs to find recall information regarding anyone in the training company he can click on "Recall Roster". This hyperlink will send the user to a table that depicts all of the training companies, platoon, and squads currently in the system.

Navigation Bar: Home, Testing, Searches, Student Registration, Student Update, AI Input, Admin, Peer Evals									
Alpha 2007					Bravo 2007				
Company					Company				
Platoon	1st Platoon	2nd Platoon	3rd Platoon	4th Platoon	Platoon	1st Platoon	2nd Platoon	3rd Platoon	4th Platoon
Squad	1st Squad	1st Squad	1st Squad	1st Squad	Squad	1st Squad	1st Squad	1st Squad	1st Squad
	2nd Squad	2nd Squad	2nd Squad	2nd Squad		2nd Squad	2nd Squad	2nd Squad	2nd Squad
	3rd Squad	3rd Squad	3rd Squad	3rd Squad		3rd Squad	3rd Squad	3rd Squad	3rd Squad
Charlie 2007					Delta 2007				
Company					Company				
Platoon	1st Platoon	2nd Platoon	3rd Platoon	4th Platoon	Platoon	1st Platoon	2nd Platoon	3rd Platoon	4th Platoon
Squad	1st Squad	1st Squad	1st Squad	1st Squad	Squad	1st Squad	1st Squad	1st Squad	1st Squad
	2nd Squad	2nd Squad	2nd Squad	2nd Squad		2nd Squad	2nd Squad	2nd Squad	2nd Squad
	3rd Squad	3rd Squad	3rd Squad	3rd Squad		3rd Squad	3rd Squad	3rd Squad	3rd Squad

Figure 32. Recall Roster Master

Once the user gets to this page he can make his selection on which platoon or squad's information he wants to view. When he clicks on the selected hyperlink he will be sent to the following page listing all of the Marine's information in that particular unit. This information is dynamic in nature and will update automatically if a student's information is updated through the "Student Update" module.

Rank	Last Name	First Name	Phone	Address	City	State	Zip
2ndLt	Digger	Richard	892-989-8798	890 Vantor Way	Quantico	VA	98098
2ndLt	Lamo	Randy	760-666-4392	991 Stinkin Dr	Quantico	VA	68432
Capt	Simmons	Randall	760-689-5201	950 Whitier Way	Quantico	VA	68432

Figure 33. Recall Roster Display

This interface is user friendly and requires minimal training to become comfortable with. As the interface was being designed, modules were submitted to the TBS Testing Officer for comment. This communication was vital in building a prototype that would meet mission requirements.

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## **V. SUMMARY CONCLUSIONS AND FUTURE RESEARCH**

### **A. SUMMARY**

TBS's information system has been used in excess of 10 years and is mission capable. A system analysis was conducted to identify areas within the current model at TBS that could be improved. During this analysis it was discovered that TBS utilized and maintained multiple stand alone databases with the same data to assist SPCs track the progression of new officers going through the POI. This discovery realized that this system was inherently inefficient causing problems with inputting, modifying and deleting data on any given marine. The second discovery noted that all progress tracking and evaluation of students was done at Camp Barrett due to remote access restriction. Remote access restriction caused for an inflexible work day and ultimately lead to longer days at the work where most administrative measures could have been done off site.

This thesis utilized the RAD methodology to design a prototype that would optimize the benefits of a centralized web enabled database. The prototype was developed using Microsoft Visual Studio 2005, Microsoft Access 2003, and Macromedia Dreamweaver MX 2004. Visio was utilized to develop the relational model needed for the database. The database was designed using Access and the web interface was constructed with Dreamweaver. Dreamweaver's functionality was enhanced with the purchase of two extensions from Macromedia's website. These two

extensions provided the multiple entry function for peer evaluations and the date data input format for staff evaluations.

## **B. CONCLUSION**

This thesis concludes that a secure centralized web enabled data base would benefit TBS. The prototype was briefed regularly to the TBS Testing Officer during design and development. The final prototype provides the benefit of inputting all registration, evaluation, personnel information currently being done by multiple databases at Camp Barret. The prototype enhances the manpower at TBS by eliminating the requirement to have 5 company testing officers saving TBS 340 man hours. It provides the SPCs with the ability to input and track officer progression wherever there is internet connectivity and it allows the students to conduct peer evaluations from any location with an internet connection saving the organization an estimated 2800 man hours. Total potential savings with this prototype is 3140 man hours per period of instruction cycle.

This concept was well embraced by the organization but was found to have short comings. TBS does not want to have to assign system maintenance to their current personnel structure. The prototype is modular in concept and can be modified as new requirements come about but an administrator would need to be trained through instruction and on the job training in order to design system modifications.

The prototype has incorporated security features but due to the sensitive nature of the web accessible information, the system would need rigorous testing and

certification through Space and Naval Warfare Systems Command (SPAWAR) before it could be ran live. This thesis recommends that common access card technology along with public key infrastructure be utilized for user identification and system authentication before implementation.

The prototype is an enhancement over the current system at TBS but can be considered a stand alone system which will house performance information which will be inaccessible to anyone outside the TBS organization. This makes it difficult to conduct trend analysis on students that graduate from TBS and correlate that data to future performance.

TBS has decided to be part of the development team that will design MCTIMS which will be an enterprise wide web enabled database which will track all Marines from initial training to the end of the Marine's career. MCTIMS embraces the benefits obtained from web enabled technology, security from public key infrastructure, and most of all it does not impact TBS's personnel structure or budget.

Applications for this research extend into tactical analysis, manpower distribution, and acquisition procurement. This technology has potential to provide the what if scenario to decision makers. DSS will reduce the cycle time devoted to decision making tasks and provide a better product to the end user whether he is the new officer at TBS or the new Marine in Fallujah. Ultimately this technology will enhance the decision makers capabilities by providing a final product with reduced risk and optimal return on investment.

The Marine Corps would benefit from utilizing an enterprise wide web enabled decision support system. An enterprise wide DSS would allow for regular maintenance from a central location. Making the DSS enterprise wide would give every level of the organization similar capabilities which would facilitate the Marine Corps' motto in pushing decision making down to the lowest level.

### **C. FUTURE RESEARCH**

The following are potential research topics for future thesis;

1. Usability and functionality analysis of MCTIMS.
2. Analysis of information security with  
MCTIMS and the systems ability to adapt to new  
information assurance challenges.
3. Analysis of the transition from legacy systems to  
MCTIMS.
4. Analysis of developing a Marine Corps DSS and its  
effects on tactical analysis, manpower  
distribution, and acquisition procurement.

World requirements call for a decision support system that will free up the time for the instructors at TBS so he or she can focus on developing Marines to fight our nation's battles. Requirements are continually changing which will require this system to be modular and adaptive to ensure quality instruction to every warrior that goes through the school.

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